

REMARKS

Claims 1-26 are pending in the application. With entry of the amendment, claims 2 and 12 are cancelled, claims 1, 3-6, 8, 10-11, 13-16, 18, 19, 21, 22 and 24 are amended and claims 27-36 are new.

Claim Amendments

Independent claims 1 and 11 are being amended to bring out distinctions over the cited art of record. In particular claim 1 now recites, in part:

- *displaying to a human observer the holograms of each of the plural video frames*
- *said frames are displayed quickly enough for the limited temporal bandwidth of the eye of said observer to impart an effect of noise variance attenuation due to averaging*
- *the noise variance of each frame is perceived by said human observer as attenuated by averaging across said plurality of holograms.*

Support for the amendments to claim 1 can be seen, for example, in the description at paragraph [0031] of the corresponding patent application publication (US2007/0113012). Claim 11 has been correspondingly amended.

New claims 27 and 32 recite that the noise fields of the holograms comprise independent and identically distributed (IID) noise as described in the application at, for example, [0049], [0056], and [0063].

Claims 28 and 33 find support at, for example, [0063].

Claims 29 and 34 find support at, for example, [0091].

Claims 30 and 35 find support at, for example, [0064] and [0094].

Claims 31 and 36 find support at, for example, [0090].

Claim Rejection Under 35 USC 102

Claims 1-26 are rejected under 35 USC 102(b) as being anticipated by Amako et al. (US5589955). The rejection is respectfully traversed.

As amended, independent claims 1 and 11 explicitly refer to displaying holograms “*to a human observer*”, in particular quickly enough for the limited temporal bandwidth of the eye to impart the effective of noise variance attenuation due to averaging. Thus these independent

claims put a constraint on the speed of display of the holograms:

“...said frames are displayed quickly enough for the limited temporal bandwidth of the eye of said observer to impart an effect of noise variance attenuation due to averaging”

This feature is not present in or suggested by Amako. At no point does Amako mention that the patterns formed are observed by a human observer, nor that any effect takes place in the eye of the observer.

Furthermore, the laser described in Amako is a YAG laser with a wavelength of 1.06 μm (column 4 line 58, making the obvious wavelength correction). Such a YAG laser is invisible to the human eye.

Moreover, the laser scribing device of Amako is a high power infrared laser which forms a pattern by evaporating part of a material surface by the heat of the laser (column 1, line 45). It is not safe for human eyes - thus it is not surprising that there is no suggestion in Amako of directing this laser towards the human eye.

Independent claims 1 and 11 also recite that:

“...the noise variance of each frame is perceived by said human observer as attenuated by averaging across said plurality of holograms.”

Amako does not consider the particular effects human perception has on the noise mitigation requirements when viewing holograms, or how such effects might be taken into account when displaying images generated using holograms to a human observer. The Examiner will appreciate that the way the human eye responds is different from the way material responds when being scribed (“evaporated by the heat of the laser” – Amako col. 1, line 45).

By contrast, embodiments of the invention relate to how to effectively display images to humans holographically. The inventors have established that, perceptually, reducing noise variance is far more important than minimizing the mean squared error when displaying holograms to humans.

Further, Amako does not teach or suggest:

“A method of displaying a holographically generated video, said video comprising a plurality of video frames...” (emphasis added)

This is because video refers to a moving image, not to a static image. Amako does not describe a system or method for displaying video.

It is further respectfully submitted that one skilled in the art would not consider modifying the apparatus of Amako, because a) Amako describes an optical machining system (see Title), b) the laser of Amako is invisible, and c) Amako’s laser would destroy the eyesight of anyone looking towards it. The problems and requirements for a system to display holographically generated video to a human observer, are very different from the requirements for optical machining in which material is “*evaporated by the heat of the laser*”.

Thus it is respectfully submitted that the subject matter of independent claims 1 and 11 is neither taught nor suggested by Amako.

Regarding claim 20, contrary to the Examiner’s assertion, it is respectfully submitted that this subject matter is neither taught nor suggested by Amako. The Examiner cross-refers to claim 10 (at page 5 of the Office Action) but this appears to be an error – the cross-reference should be to claim 4 (the subject matter of claim 4, not claim 10, is similar to that in claim 20).

In relation to claim 4 the Examiner refers to Amako column 5, lines 40-65, but this does not support the Examiner’s position. In particular, features which are entirely absent from Amako include:

- a) forming a first data set, the members of said first data set having respective amplitudes equal to the amplitudes of respective desired pixels;
- b) performing an inverse Fourier transform on the first data set to provide second data set;
- c) shifting the second data set in the real direction in the complex plane sufficiently to form a third data set in which the phase of each data point is small;
- d) forming as a fourth data set the magnitude of the third data set; and
- e) binarising the fourth data set to form a fifth data set for display as said hologram.

The approach of Amako is completely different. The sole point of similarity is the reference to a Fourier transform, but there is nothing else in common. Thus it is respectfully submitted that the subject matter of independent claim 20 is neither taught nor suggested by Amako.

Regarding new dependent claims 27 and 32, it is neither taught nor suggested by Amako that “*the noise fields of the holograms comprise independent and identically distributed noise*”. This is not surprising because Amako focuses on speckle reduction whereas the inventors have realized that, so far as perception by the human eye is concerned, it is more important to attenuate noise variance. Simple random initialization does not necessarily generate IID noise.

New dependent claims 28 and 33 recite taking the real or imaginary part of the holographic transformation to provide a hologram. By contrast, Amako teaches employing an inverse tangent operator (Box 216 in Figure 2, described at column 5, lines 65 to 66).

The skilled person would expect that an inverse tangent would be needed to convert to amplitude and phase values. Amako indeed teaches that such an inverse tangent is needed.

By contrast, the inventors have recognized that an inverse tangent is not necessary. It is respectfully submitted that it is not obvious that taking either the real or imaginary component of the complex valued data would provide a hologram, in particular one which, when displayed as video, would give rise to reduced noise variance in an observer's eye.

Claims 3-10, 13-19 and 21-36, which depend from corresponding independent claims 1, 11 and 20, are allowable for at least the same reasons given above for allowance of independent claims 1, 11 and 20.

Reconsideration of the rejection under 35 USC 102 is respectfully requested.

Information Disclosure Statement

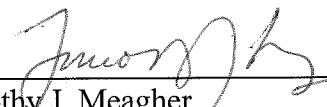
A Supplemental Information Disclosure Statement (SIDS) is being filed concurrently herewith. Entry of the SIDS is respectfully requested.

CONCLUSION

In view of the above amendments and remarks, it is believed that all claims are in condition for allowance, and it is respectfully requested that the application be passed to issue. If the Examiner feels that a telephone conference would expedite prosecution of this case, the Examiner is invited to call the undersigned.

Respectfully submitted,

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